Socioeconomic Status and Adolescent Mental Disorders

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Significant associations between low socioeconomic status (SES) and mental disorder have been found throughout the developed world in studies of both adults and children.[1-3] However, low SES can be defined in numerous ways. Existing studies have been relatively unsystematic in their selection of indicators and have seldom compared results across indicators, making it impossible to know from the available evidence which of the several components of SES accounts for the overall association between low SES and mental disorder. A family may be poor according to a governmental definition of adequate income (absolute poverty) or, alternatively, may have low income relative only to that of others in the community (relative deprivation). A family may live in an area of high poverty,[4] in an area of high income inequality (community inequality), or in a community in which a high proportion of the population lives in both poverty and high inequality.[5] Relative deprivation can also be measured as a subjective state, as in the individual's sense of whether he or she is better off or worse off than other people (subjective social status). There is reason to think that subjective social status might be important in and of itself, as previous research has shown that subjective social status is associated with health independent of income or education.[6]

Although socioeconomic gradients in health are well documented using this range of indicators,[6-8] we know of no studies that have simultaneously examined the relative importance of absolute and relative SES, subjective social status, and community level inequality in predicting mental health. We also are not aware of any studies examining how associations between different aspects of SES and mental health vary across sociodemographic groups. Such variations are likely, given that the association between low SES and mental illness has been shown to vary in different racial/ethnic groups.[9-11]

These distinctions have important implications for intervention. Some researchers have argued that social factors such as poverty and

Objectives. Although previous research has shown that low socioeconomic status (SES) is associated with mental illness, it is unclear which aspects of SES are most important. We investigated this issue by examining associations between 5 aspects of SES and adolescent mental disorders.

Methods. Data came from a national survey of US adolescents (n = 6483). Associations among absolute SES (parental income and education), relative SES (relative deprivation, subjective social status), and community level income variation (Gini coefficient) with past-year mental disorders were examined.

Results. Subjective social status (mean 0, variance 1) was most consistently associated with mental disorder. Odds ratios with mood, anxiety, substance, and behavior disorders after controlling for other SES indicators were all statistically significant and in the range of 0.7 to 0.8. Associations were strongest for White adolescents. Parent education was associated with low risk for anxiety disorder, relative deprivation with high risk for mood disorder, and the other 2 indicators were associated with none of the disorders considered.

Conclusions. Associations between SES and adolescent mental disorders are most directly the result of perceived social status, an aspect of SES that might be more amenable to interventions than objective aspects of SES. (*Am J Public Health.* 2012;102:1742–1750. doi:10.2105/AJPH.2011.300477)

income inequality are "fundamental causes" of mental disorders because they limit access to important health-promoting resources.[4] If that is the case, then prevention efforts should target factors operating at the societal level. If, however, deprivation increases the risk of mental disorder only to the extent that individuals perceive their social status to be low, then changing the social environment will not be enough unless such changes also lead to changes in subjective social status. Although factors operating at multiple levels are likely to influence the development of mental health problems in adolescents, the relative contribution of these various aspects of SES remains unknown.

In this study we used data from the National Comorbidity Survey Adolescent Supplement (NCS-A),[12,13] a national survey of US adolescents, to examine the associations between 5 aspects of SES and mental disorders across 3 racial/ethnic groups in the United States: parent educational attainment, family income, relative deprivation, subjective social status, and community level inequality.

METHODS

The NCS-A was carried out between February 2001 and January 2004. Adolescents aged 13 to 17 years were interviewed face-to-face in dual-frame household and school samples selected to be representative of the US population.[12,13] The household sample included 904 adolescents (879 in school and 25 who had dropped out of school) from households that participated in the National Comorbidity Survey Replication (NCS-R), a national survey of adults.[14] The adolescent response rate, conditional on NCS-R participation, was 86.8%. The school sample included 9244 adolescents from a representative sample of schools in the NCS-R counties. The adolescent response rate, conditional on school participation, was 82.6%. The proportion of schools initially selected to participate in the NCS-A was low (28.0%). Matched replacement schools were selected for schools that declined to participate. A comparison between household sample respondents who attended nonparticipating schools and school sample respondents from replacement schools found no evidence of bias in estimates of either prevalence or mental disorder

correlates resulting from the use of replacement schools.[13]

One parent or guardian was asked to complete a self-administered questionnaire (SAQ) about the participating adolescent's developmental history and mental health. The self-administered questionnaire response rate, conditional on adolescent participation, was 82.5% in the household sample and 83.7% in the school sample. This article focuses on the 6483 adolescent-parent pairs for whom data were available from both adolescent interviews and self-administered questionnaires (Table 1).

Written informed consent was obtained from parents or guardians before approaching adolescents. Written assent was then obtained from adolescents before surveying either adolescents or parents. Each respondent was given $50 for participation. These recruitment and consent procedures were approved by the Human Subjects Committees of both Harvard Medical School and the University of Michigan. Once the survey was completed, cases were weighted for variation in within-household probability of selection in the household sample and residual discrepancies between sample and population sociodemographic and geographic distributions. The household and school samples were then merged with sums of weights proportional to relative sample sizes, adjusted for design effects in estimating disorder prevalence. These weighting procedures are detailed elsewhere.[12,13] The weighted sociodemographic distributions of the composite sample closely approximate those of the US census population.[15] The weighted distribution of sociodemographic factors in the NCS-A is shown in Table 1.

Measures

Diagnostic Assessment. Adolescents were administered a modified version of the Composite International Diagnostic Interview, a fully structured interview designed for use by trained lay interviewers.[16] For these analyses, diagnoses were grouped into 4 classes: mood disorders (major depressive disorder or dysthymia, and bipolar I-II disorder), anxiety disorders (panic disorder with or without agoraphobia, agoraphobia without history of panic disorder, social phobia, specific phobia, generalized anxiety disorder, posttraumatic stress disorder, and separation anxiety disorder), disruptive behavior

disorders (attention-deficit/hyperactivity disorder, oppositional-defiant disorder, conduct disorder, and intermittent explosive disorder), and substance disorders (alcohol and drug abuse and alcohol and drug dependence with abuse).

Parents and adolescents provided diagnostic information about major depressive disorder, attention-deficit/hyperactivity disorder, oppositional-defiant disorder, and conduct disorder, those disorders for which parent reports have previously been shown to play the largest part in diagnosis.[17] Parent and adolescent reports were combined at the symptom level using an "or" rule, such that a symptom was considered present if it was endorsed by either respondent. All but 2 symptoms were diagnosed using *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*) diagnostic hierarchy rules. The exceptions were oppositional-defiant disorder, which was defined with or without conduct disorder, and substance abuse, which was defined with or without dependence. The current report focuses on disorders that were present during the 12 months prior to the interview.

Socioeconomic Status. We examined associations of adolescent mental disorders with indicators of absolute and relative SES and with a community level measure of income distribution. Absolute SES variables included highest parental educational attainment and gross household income.

Parent education was coded in 4 categories: college graduate or advanced degree (the reference group), some college, high school graduation, and less than high school graduation.

Family household income was defined in relation to the poverty line, consistent with previous epidemiological surveys,[18,19] using the standard approach of welfare economics.[20] Low income was defined as less than 1.5 times the official federal poverty line; low-average income was defined as 1.5 to 3 times the poverty line; high-average income as 3 to 6 times the poverty line; and high income (reference group) was defined as 6 or more times the poverty level.

Relative deprivation was defined as the difference between each adolescent's total household income and the mean income of all households in the adolescent's census tract, divided by the standard deviation of tract-level income of those households,[21] calculated using

all households in the participating adolescent's census tract, with higher values indicating greater income deprivation.

Community-level income inequality was estimated using the Gini coefficient in each adolescent's census tract. The Gini coefficient is among the most widely used measures of income inequality[22-25] and ranges from 0 in situations of complete equality (i.e., everyone has the same income) to 1 in situations of complete inequality (i.e., 1 person has all the income). The association between the Gini coefficient and health is similar to associations observed for other markers of income inequality.[23] We standardized the Gini coefficient to have a mean of 0 and a standard deviation of 1 in the current analysis.

Subjective social status was assessed using a questionnaire developed for use with adolescents by the MacArthur SES and Health Network[26] to determine where individuals believe they rank in the social hierarchy.[6,27] Respondents were shown a drawing of a ladder with 10 rungs and told to

> (t)hink of this ladder as representing where young people stand in your school, neighborhood, or community. At the top of the ladder are the young people who have the highest standing. At the bottom are those who have the worst standing.

Respondents were then instructed to place an *X* on the rung that best represented their perception of where they stood relative to other young people. The original adult scale was developed to capture multiple aspects of socioeconomic position simultaneously.[6,27] It is strongly associated with objective indicators of SES and the primary predictors of where an individual places himself or herself on the ladder are socioeconomic factors (occupation, income, education, satisfaction with standard of living, and financial security).[26-28] The scale has been associated with a wide range of health outcomes, including obesity, hypertension, diabetes, and depression, in both adolescents and adults.[27-33] We standardized the subjective social status variable to have a mean of 0 and a standard deviation of 1.

Analysis

We examined the association between adolescent SES and mental disorders during the previous 12 months by using logistic

TABLE 1—Weighted Distribution of Sociodemographic Factors and SES Indicators by Ethnicity: National Comorbidity Survey Adolescent Supplement, February 2001–January 2004

Factor	Non-Hispanic White (n = 4257), % (SE)	Black (n = 1097), % (SE)	Hispanic (n = 758), % (SE)	Other (n = 371), % (SE)	Total Sample (n = 6483), % (SE)
Sex					
Male	52.5 (1.3)	46.6 (2.2)	50.7 (4.3)	50.3 (3.6)	51.2 (1.1)
Female	47.5 (1.3)	53.4 (2.2)	49.3 (4.3)	49.7 (3.6)	48.8 (1.1)
χ^2_3 (P)[a]	3.2 (.35)				
Age, y					
13	13.7 (1.7)	19.9 (2.8)	17.0 (2.9)	18.4 (4.0)	15.3 (1.6)
14	19.5 (1.4)	18.9 (1.8)	24.3 (3.9)	29.3 (4.1)	20.6 (1.2)
15	21.8 (1.2)	23.5 (2.5)	18.6 (2.6)	14.3 (2.8)	21.2 (1.0)
16	21.4 (1.4)	20.1 (2.3)	19.2 (3.9)	17.0 (2.8)	20.7 (1.3)
17–18	23.7 (1.4)	17.5 (1.7)	20.9 (2.6)	20.9 (4.0)	22.2 (1.2)
χ^2_{12} (P)[a]	21.8* (.04)				
Parent Education					
< high school	3.7 (0.6)	8.8 (1.2)	18.4 (2.0)	6.2 (1.4)	6.7 (0.5)
High school	28.9 (1.7)	43.9 (3.0)	30.0 (2.2)	25.0 (3.5)	31.1 (1.3)
Some college	22.4 (1.2)	24.8 (1.8)	24.8 (2.5)	15.3 (2.5)	22.8 (0.9)
> college	45.0 (1.7)	22.4 (2.1)	26.8 (2.3)	53.5 (4.7)	39.4 (1.5)
χ^2_9 (P)[a]	194.1* (< .001)				
Household income					
≤ 1.5 × poverty	9.0 (0.8)	29.2 (2.9)	24.2 (4.0)	15.9 (3.1)	14.6 (1.1)
> 1.5 and ≤ 3 × poverty	16.3 (0.9)	26.8 (2.2)	23.7 (2.2)	22.8 (3.4)	19.3 (0.9)
> 3 and ≤ 6 × poverty	36.2 (1.3)	24.3 (2.0)	26.0 (1.9)	30.4 (3.5)	32.6 (1.2)
> 6 × poverty	38.5 (1.7)	19.7 (2.4)	26.2 (4.0)	30.8 (3.7)	33.5 (1.5)
χ^2_9 (P)[a]	174.4* (< .001)				
Tract level relative deprivation[b,c]					
Quartile 1 (≤ –0.17)	20.6 (1.0)	34.6 (2.3)	30.8 (3.3)	34.6 (3.1)	24.9 (1.2)
Quartile 2 (–0.17, 0.51)	24.7 (1.0)	28.9 (1.9)	24.2 (1.9)	20.7 (3.0)	25.1 (0.9)
Quartile 3 (0.51, 1.63)	27.4 (1.0)	19.6 (2.2)	20.4 (1.8)	22.6 (2.8)	25.0 (0.9)
Quartile 4 (> 1.63)	27.2 (1.1)	16.9 (1.9)	24.5 (3.6)	22.1 (3.1)	25.0 (1.2)
χ^2_9 (P)[a]	76.2* (< .001)				
Tract level Gini coefficient[b,d]					
Quartile 1 (≤ –0.65)	28.9 (2.2)	16.8 (2.3)	15.5 (2.7)	26.3 (3.2)	25.0 (1.8)
Quartile 2 (–0.65, –0.07)	27.4 (2.0)	15.8 (2.2)	23.1 (2.9)	29.2 (6.4)	25.1 (1.8)
Quartile 3 (–0.07, 0.59)	25.2 (1.6)	18.3 (1.9)	32.3 (4.5)	19.1 (3.6)	24.9 (1.3)
Quartile 4 (> 0.59)	18.5 (2.0)	49.2 (4.0)	29.1 (3.4)	25.4 (4.7)	25.0 (2.0)
χ^2_9 (P)[a]	123.1* (< .001)				
Subjective Social Status					
0–4	6.3 (0.5)	5.3 (1.4)	8.8 (1.9)	4.9 (1.0)	6.4 (0.6)
5–6	25.3 (1.1)	27.5 (2.3)	34.1 (2.4)	32.6 (5.1)	27.3 (1.0)
7–8	47.2 (1.6)	45.6 (2.6)	40.1 (2.6)	47.0 (4.6)	45.9 (1.2)
9–10	21.2 (1.1)	21.6 (1.9)	17.0 (1.4)	15.5 (2.3)	20.4 (0.9)
χ^2_9 (P)[a]	23.2* (.006)				
Unweighted no.	4257	1097	758	371	6483

Note. The sample size was n = 6483.

[a]Differences in the distribution of sociodemographic factors and SES indicators across racial or racial/ethnic groups were examined using the χ^2 test.
[b]Cutpoints were chosen to generate quartiles as closely as possible in the total sample.
[c]Quartile 1 denotes the lowest level of relative deprivation, whereas quartile 4 denotes the highest level of relative deprivation.
[d]Quartile 1 denotes the lowest level of inequality, whereas quartile 4 denotes the highest level of inequality.
[e]The distribution of subjective social status scores made it difficult to create quartiles; most respondents rated themselves as a 7 or 8, but there were not enough respondents with a rating of either 7 or 8 to create separate categories for these values.
*P < .05, 2-sided test.

regression. For each outcome, we first estimated a base model that included absolute SES indicators (parental education and income) as predictors of disorders and then estimated successively more complex models that added relative and community level SES indicators to the base model 1 at a time. The most complex model included all indicators simultaneously. Models were estimated first in an overall data array, that is, a consolidated data file that stacked the 20 separate disorder-specific files and included 19 dummy variables to distinguish among these files, thereby forcing the estimated slopes of disorders on SES indicators to be constant across disorders. This model was then estimated again in subsamples defined by disorder class (mood, anxiety, disruptive behavior, and substance disorders) to investigate the possibility of variation in associations of the predictors with the different kinds of outcome disorders, and race/ethnicity (non-Hispanic White [White], non-Hispanic Black [Black], and Hispanic). Controls for respondent age (coded in 4 dummy variables corresponding to ages 13 or 14, 15, 16, and 17) and gender were included in all models. Relative deprivation, community level inequality, and subjective social status were treated as linear variables in the analyses. Because each of the relative SES indicators was standardized, coefficients for these variables represented the change in odds of a mental disorder associated with 1 standard deviation change in that indicator. Logistic regression coefficients and standard errors were exponentiated to create odds ratios (ORs) with 95% confidence intervals (CI). Standard errors were estimated using the Taylor series linearization method to account for sample weights and clustering. The Wald χ^2 test was used to evaluate the joint significance of sets of predictors. Statistical significance was consistently evaluated using .05-level 2-sided tests.

RESULTS

All but 1 of the bivariate correlations among SES indicators was significant (Table 2). However, correlations between subjective social status and the other indicators of SES were generally smaller in magnitude than those among the "objective" indicators.

Socioeconomic Status Indicators and Adolescent Mental Disorder

We first examined a series of bivariate models including each of the 5 SES indicators considered alone in predicting past-year mental disorder, adjusting for demographics (Table 3, model 1). These models showed significant associations between past-year disorders and parent educational attainment ($\chi^2_3 = 17.3$; $P < .001$), such that respondents whose parents had less than a college degree had higher odds of disorder (ORs = 1.2–1.5), and subjective social status, such that adolescents who rated themselves as being 1 step higher on the ladder had 14% lower odds of meeting criteria for a mental disorder (OR = 0.8; $\chi^2_1 = 42.3$; $P < .001$).

Five subsequent models were examined: the first including income and education, the next 3 models added a measure of relative SES (tract-level relative deprivation, tract-level Gini coefficient, and subjective social status), and the fifth model was a fully adjusted model. In the first of these models, family income was not associated with past-year adolescent disorders ($\chi^2_3 = 1.3$; $P = .723$), but parent educational attainment was ($\chi^2_3 = 11.1$; $P = .011$) (Table 3; model 2). Adolescents whose parents did not complete high school (OR = 1.4) or attended some college but did not graduate (OR = 1.4) had elevated odds of past-year disorder relative to those of adolescents whose parents graduated college. Controlling for parental education and income, neither relative deprivation (OR = 1.0; $\chi^2_1 = 2.8$; $P = .094$) nor tract-level Gini coefficient (OR = 1.0; $\chi^2_1 = 1.6$; $P = .211$) were associated with adolescent disorders. In contrast, subjective social status was associated with past-year disorders, such that adolescents who rated themselves as being 1 step higher on the ladder had 14% lower odds of meeting criteria for a mental disorder (OR = 0.8; $\chi^2_1 = 35.3$; $P < .001$). In the fully adjusted model including all SES indicators simultaneously, only parental education ($\chi^2_3 = 9.0$; $P = .029$) and subjective social status (OR = 0.8; $\chi^2_1 = 33.8$; $P < .001$) were associated with past-year adolescent disorders. Associations between SES and mental disorders in the final multivariate model were quite similar to the patterns observed in the bivariate models.

Subsequent analysis focused on this final multivariate model (Table 3).

Differential Associations by Class of Disorder

A test for variation associations of the 9 SES coefficients in predicting the 4 disorder classes was significant ($\chi^2_{27} = 250.6$; $P < .001$), indicating that these associations differed across disorder classes (Table 4). Associations between SES indicators and anxiety disorders showed a pattern similar to that of the general model. In the fully adjusted model, parental education ($\chi^2_3 = 8.7$; $P = .034$) and subjective social status (OR = 0.8; $\chi^2_1 = 13.9$; $P < .001$) were associated with past-year anxiety disorders. For mood disorders, relative deprivation (OR = 1.1; $\chi^2_1 = 3.9$; $P = .048$) and subjective social status (OR = 0.8; $\chi^2_1 = 25.3$; $P < .001$) were significant in the fully adjusted model. Subjective social status was the only SES indicator significantly associated with disruptive behavior disorders (OR = 0.7; $\chi^2_1 = 26.8$; $P < .001$) and substance use disorders (OR = 0.7; $\chi^2_1 = 23.3$; $P < .001$) in the fully adjusted models. Tests for variations in the associations of individual SES indicators across disorders revealed significant differences for family income ($\chi^2_3 = 25.7$; $P = .002$) and subjective social status ($\chi^2_3 = 14.0$; $P = .003$) (Table 4).

Socioeconomic Status and Adolescent Mental Disorder by Race/Ethnicity

A test for variations in the associations of the 9 SES coefficients predicting mental disorders across the 3 racial/ethnic groups was significant ($\chi^2_{18} = 101.1$; $P < .001$; Table 5). The pattern of associations among White adolescents mirrored the findings in the total sample: parent education ($\chi^2_3 = 10.6$; $P = .014$) and subjective social status (OR = 0.7; $\chi^2_1 = 36.6$; $P < .001$) were associated with past-year disorders in the fully adjusted model. Among Hispanic adolescents, by comparison, only subjective social status was associated with mental disorder (OR = 0.8; $\chi^2_1 = 7.9$; $P = .005$, in the fully adjusted model), whereas none of the SES indicators considered here was associated with mental disorders among Black adolescents. A test result for racial/ethnic variations in the

TABLE 2—Correlations Among Measures of Socioeconomic Status: National Comorbidity Survey Adolescent Supplement, February 2001–January 2004

Measure	Categorical Parent's Education	Categorical Parent's Income	Relative Deprivation	Tract-Level Gini Cofficient	Subjective Social Status
Parent's education	1				
Family income	0.34*	1			
Tract-level relative deprivation	0.17*	0.52*	1		
Tract-level Gini coefficient	-0.13*	-0.20*	-0.08*	1	
Subjective social status	0.13*	0.12*	0.09*	0.00	1

*$P < .05$, 2-sided test.

associations among individual SES indicators with past-year disorder was significant only for subjective social status ($\chi^2_2 = 21.3$; $P<.001$). The association between subjective social status and mental disorder for Black adolescents differed compared with those of both White ($\chi^2_1 = 20.9$; $P<.001$) and Hispanic adolescents ($\chi^2_1 = 5.5$; $P = .020$) but did not differ for Hispanic versus non-Hispanic White adolescents ($\chi^2_1 = 0.8$; $P = .678$; Table 5).

Subjective Social Status and Other Socioeconomic Status Indicators

Finally, we examined interactions between subjective social status and each of the other SES indicators in predicting past-year mental disorder. (Detailed results are not shown but are available on request). This analysis revealed a significant interaction between parental education and subjective social status in predicting behavior disorders

($\chi^2_3 = 16.6$; $P<.001$). Higher subjective status was associated with reduced odds of behavior disorders among most respondents but not among those whose parents had the lowest level of education. A similar pattern was observed for non-Hispanic White and Hispanic adolescents, whereas among Black adolescents, subjective status was associated with reduced odds of mental disorder only among those whose parents had a college degree.

TABLE 3—Associations of Absolute and Relative SES Indicators With 12-Month *DSM-IV* Mental Disorders: National Comorbidity Survey Adolescent Supplement, February 2001–January 2004

Indicator	Model 1: Bivariate Associations,[a] OR (95% CI)	Model 2: Absolute SES, OR (95% CI)	Model 3: Relative Deprivation, OR (95% CI)	Model 4: Tract-Level Inequality, OR (95% CI)	Model 5: Subjective Social Status, OR (95% CI)	Model 6: Fully Adjusted Model, OR 95% CI
Parent education						
< high school	1.5* (1.1, 2.0)	1.4* (1.0, 2.0)	1.5* (1.0, 2.0)	1.5* (1.0, 2.0)	1.3 (0.9, 1.9)	1.3 (0.9, 1.9)
High school	1.2* (1.0, 1.5)	1.2 (1.0, 1.5)	1.2 (1.0, 1.5)	1.2 (1.0, 1.5)	1.1 (0.9, 1.4)	1.2 (1.0, 1.4)
Some college	1.4* (1.2, 1.7)	1.4* (1.1, 1.8)	1.4* (1.1, 1.8)	1.4 (1.1, 1.8)	1.4* (1.1, 1.7)	1.4* (1.1, 1.7)
χ^2_3 (2-sided P)	17.3* (< .001)	11.1* (.011)	11.3* (.01)	8.8* (.033)	11.2* (.011)	9.0* (.029)
Family income						
< 1.5 × poverty	1.1 (0.8, 1.6)	1.0 (0.8, 1.5)	0.9 (0.7, 1.3)	1.1 (0.8, 1.5)	1.0 (0.7, 1.4)	0.9 (0.7, 1.3)
> 1.5 and < 3 × poverty	1.2 (1.0, 1.5)	1.1 (0.9, 1.5)	1.0 (0.8, 1.3)	1.1 (0.9, 1.5)	1.1 (0.8, 1.4)	1.0 (0.8, 1.3)
> 3 and <6 × poverty	1.1 (0.9, 1.3)	1.0 (0.8, 1.3)	1.0 (0.8, 1.2)	1.0 (0.9, 1.3)	1.0 (0.9, 1.2)	1.0 (0.8, 1.2)
χ^2_3 (2-sided P)	2.8 (.42)	1.3 (.723)	0.9 (.823)	1.0 (.813)	1.4 (.713)	0.7 (.873)
Relative SES indicators						
Relative deprivation	1.0 (0.9, 1.0)		1.0 (1.0, 1.1)			1.0 (1.0, 1.1)
Tract-level Gini coefficient	1.0 (0.9, 1.0)			1.0 (0.9, 1.0)		1.0 (0.9, 1.0)
Subjective social status	0.8* (0.7, 0.8)				0.8* (0.7, 0.8)	0.8* (0.7, 0.8)

Note. CI = confidence interval; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; OR = odds ratio; SES = socioeconomic status. The sample size was n = 6483. Models were estimated in a logistic regression framework and controlled for age, gender, and race/ethnicity. The outcome variable in all models is presence of a past-year mental disorder.
[a]Bivariate models present the association between each of the SES variables, considered alone, and past-year mental disorder, controlling for the demographic factors listed above.
*$P < .05$, 2-sided test.

TABLE 4—Multivariate Associations of SES Indicators With 12-Month *DSM*-IV Mood, Anxiety, Disruptive Behavior, and Substance Disorders: National Comorbidity Survey Adolescent Supplement, February 2001–January 2004

Indicator	Mood Disorders, OR (95% CI)	Anxiety Disorders, OR (95% CI)	Disruptive Behavior Disorders, OR (95% CI)	Substance Disorders, OR (95% CI)	χ^2 (P)
Parent education					11.1 (.27)[a]
< high school	1.0 (0.6, 1.5)	1.5* (1.1, 2.2)	1.3 (0.8, 2.1)	1.5 (0.8, 2.9)	
High school	1.2 (0.9, 1.5)	1.2 (0.9, 1.4)	1.2 (0.9, 1.5)	1.1 (0.7, 1.7)	
Some college	1.4* (1.1, 1.7)	1.3* (1.0, 1.7)	1.3* (1.0, 1.8)	1.6* (1.0, 2.6)	
χ^2_2 (P)	7.4 (.06)	8.7* (.034)	4.8 (.187)	6.7 (.083)	
Family Income					25.7* (.002)[a]
< 1.5 × poverty	0.7 (0.5, 1.2)	1.2 (0.8, 1.7)	0.9 (0.6, 1.4)	0.5* (0.3, 1.0)	
> 1.5 and < 3 × poverty	0.8 (0.6, 1.1)	1.2 (0.9, 1.6)	1.2 (0.9, 1.6)	0.6 (0.3, 1.1)	
> 3 and < 6 × poverty	0.8 (0.6, 1.0)	1.1 (0.8, 1.4)	1.1 (0.8, 1.4)	0.8 (0.5, 1.2)	
χ^2_2 (P)	3.1 (.375)	1.4 (.704)	3.2 (.358)	5.0 (.173)	
Relative SES indicators					64.8* (< .001)[a]
Relative deprivation	1.1* (1.0, 1.1)	1.0 (1.0, 1.0)	1.0 (1.0, 1.1)	1.1 (1.0, 1.1)	6.3 (.1)[b]
Tract-level inequality	1.0 (0.9, 1.1)	1.0 (0.9, 1.1)	1.0 (0.9, 1.1)	0.9 (0.8, 1.0)	7.4 (.06)[b]
Subjective social status	0.8* (0.7, 0.9)	0.8* (0.8, 0.9)	0.7* (0.7, 0.8)	0.7* (0.6, 0.8)	14.0* (.003)[b]

Note. CI = confidence interval; *DSM-IV* = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; OR = odds ratio; SES = socioeconomic status. Models were estimated in a logistic regression framework that included all indicators of SES (parent education, parent income, tract-level relative deprivation, subjective social status, and tract-level inequality) and controlled for age, gender, and ethnicity. The associations of the 9 SES indicators differed significantly across the 4 disorder classes, $\chi^2_{27} = 250.6$, $P < .001$. The sample size was n = 6483.
[a]Chi-square test for variation in the association of each group of SES indicators (parent education, family income, and relative SES) across the 4 disorder classes.
[b]Chi-square test for variation in the association of each individual relative SES indicator with mental disorder across the 4 disorder classes.
*P < .05, 2-sided test.

DISCUSSION

In this article, we examined the associations of 5 aspects of SES with adolescent mental disorders in a representative population-based sample. We were particularly interested in determining the relative importance of absolute measures of SES (parental education and income), relative measures of SES (relative deprivation and community level income inequality), and subjective social status.[6,26,28] Nearly all measures of SES are significantly intercorrelated among themselves but not so strongly that it is not possible to study the associations of each aspect of SES with adolescent mental disorders while controlling for the others.

Subjective social status is the SES indicator most consistently related to mental disorders. This association is significant in almost all models in which it was tested. Lower subjective status is associated with higher odds of each of the 4 disorder classes. The association between subjective social status and mental disorders varies, though, by parental education. Subjective social status was less strongly associated with past-year disorder among adolescents whose parents had

low levels of education. Of the absolute SES measures, family income was unassociated with all mental disorder classes, whereas lower parental education was associated with higher odds of mental disorder. Parental education was associated only with anxiety disorders in the fully adjusted model, but adolescents whose parents had some college education but did not complete a degree were more likely to have a mental disorder across all diagnostic groups. Relative SES measures were not associated with adolescent mental disorders. Relative deprivation was associated only with odds of mood disorder, and community level inequality was unassociated with adolescent mental disorder in all models.

These findings suggest that among adolescents, one's perception of social status is the aspect of SES most strongly associated with mental health. Some previous studies have shown associations between material disadvantage that were stronger than those perceived for social status and mental disorders, whereas other studies have found the opposite.[5,33–35] The measure used in the current study required adolescents to mark a rung on a ladder corresponding to "where you think you stand relative to other

young people in your school, neighborhood, or community." The acute sensitivity of adolescents to their social status at school is well documented,[36] and these status perceptions may be more important determinants of mental health than traditional SES indicators in this age group. Although the primary factors associated with subjective social status ratings in adults are socioeconomic, including income, education, and occupation,[27] future research needs to explore how status dimensions other than parental income and education, such as membership in social groups and possession of desirable objects, are involved in these judgments among adolescents.[37] The interaction between subjective social status and education indicates that perceptions of status are less strongly associated with mental health among adolescents whose parents have the lowest levels of education, suggesting that status perceptions are linked to mental health only among adolescents who have surpassed a certain threshold of objective SES. In other words, perceptions of one's status are less important if one's objective status is quite low. We are unaware of previous research that has examined interactions between subjective social

TABLE 5—Multivariate Associations of Absolute and Relative SES Indicators With 12-Month *DSM-IV* Mental Disorders, by Ethnicity: National Comorbidity Survey Adolescent Supplement, February 2001–January 2004

Indicator	Black (n = 1097), OR (95% CI)	Hispanic/Latino (n = 758), OR (95% CI)	Non-Hispanic White (n = 4257), OR (95% CI)	χ^2 (P)
Parent Education				4.4 (.62)[a]
< high school	1.5 (0.8, 3.0)	1.3 (0.6, 2.8)	1.2 (0.7, 2.0)	
High school	1.1 (0.7, 1.6)	1.1 (0.7, 1.8)	1.2 (0.9, 1.5)	
Some college	1.0 (0.6, 1.6)	1.5 (0.7, 3.2)	1.4* (1.1, 1.7)	
χ^2_3 (P)	2.2 (.533)	1.2 (0.762)	10.6* (0.014)	
Family Income				5.5 (.48)[a]
<1.5 × poverty	1.3 (0.7, 2.6)	0.5 (0.2, 1.1)	0.9 (0.6, 1.4)	
>1.5 and < 3 × poverty	1.2 (0.6, 2.3)	0.7 (0.4, 1.5)	1.1 (0.9, 1.4)	
>3 and < 6 × poverty	1.0 (0.6, 1.9)	0.7 (0.4, 1.5)	1.0 (0.8, 1.2)	
χ^2_3 (P)	1.6 (0.665)	4.9 (0.176)	2.9 (0.415)	
Relative SES indicators				23.0* (< .001)[a]
Relative deprivation	1.0 (1.0, 1.1)	1.0 (0.9, 1.1)	1.0 (1.0, 1.1)	0.2 (.92)[b]
Tract-level inequality	0.9 (0.8, 1.1)	0.9 (0.7, 1.0)	1.0 (0.9, 1.1)	1.6 (.45)[b]
Subjective social status	1.0 (0.9, 1.1)	0.8* (0.7, 0.9)	0.7* (0.7, 0.8)	21.3* (< .001)[b]

Note. CI = confidence interval; *DSM-IV* = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; OR = odds ratio; SES = socioeconomic status. Models were estimated in a logistic regression framework that included all indicators of SES (parent education, parent income, tract-level relative deprivation, subjective social status, and tract-level inequality) and controlled for age and gender. Adolescents whose race/ethnicity was classified as "Other" were excluded because of the small number of adolescents in this group. The associations of the 9 SES indicators, as a set, differed significantly across the 3 racial/ethnic groups, χ^2_{18} = 101.1, P < .001. The sample size was n = 6483.

[a]Chi-square test for variation in the association of each group of SES indicators (parent education, family income, and relative SES) with mental disorder across the 3 racial/ethnic groups.

[b]Chi-square test for variation in the association of each individual relative SES indicator with mental disorder across the 3 racial/ethnic groups.

*P < .05, 2-sided test.

status and other SES indicators; this warrants further examination in future research.

In the United States, racial/ethnic differences in income often make it difficult to disentangle associations of race/ethnicity from associations of poverty with mental disorders. Using a large sample representative of the United States, we found clear racial/ethnic differences among associations between objective and subjective social status and adolescent mental health. First, parental education is associated with mental disorders only among non-Hispanic White adolescents. Second, none of the SES indicators in these analyses is associated with mental disorders in Black adolescents, despite the fact that only half as many Black participants have parents with a college degree as White participants and that the average household income of Black families is less than 60% of that of non-Hispanic White families in the study.[15] Many,[9,10,38] but not all,[1] studies of child and adolescent mental health have noted a stronger association between poverty and mental disorders among non-Hispanic White youths than among youths of other racial/ethnic backgrounds.

Finally, subjective social status is associated with increased odds of mental disorders in non-Hispanic White and Hispanic adolescents but not in Black youths, although racial/ethnic differences in subjective social status are smaller than differences in income or education (Table 1). It has been suggested that minority racial status influences the goals and outlook of Black children beginning at a very early age, lowering their expectations for future success.[27] Low perceptions of social status have been linked to low expectations for oneself and one's future.[28,39,40] Given that perceptions of status incorporate judgments of future prospects and opportunities, SES may be less strongly associated with mental health among Black adolescents because their status expectations are lower. Lower status expectations may attenuate the relationship between SES and mental health among Black adolescents because being raised in a low-SES family does not violate their status expectations. Indeed, previous studies have observed stronger associations between subjective social status and health in non-Hispanic White than in Black individuals.[31,41] Another possibility

is that Black adolescents rely on criteria to rank themselves on the social ladder that are different from White adolescents. Previous research has shown that determinants of subjective status vary as a function of cultural identity and community context,[39] raising the possibility that this measure captures different dimensions of status across racial/ethnic groups. Goodman et al.[28] found that objective indicators of SES are less strongly linked to subjective social status rankings in Black adolescents than in non-Hispanic White adolescents, suggesting that factors beyond SES contribute to their perceptions of social status. A final explanation for the lack of association between subjective status and mental disorder in Black adolescents relates to parental education. Less than one fourth of Black adolescents in the survey had parents with a college degree, and we found that status perceptions were associated with mental health most strongly for those with high parental education. Identifying mechanisms explaining racial/ethnic differences in the association of SES with adolescent mental health is an important goal for future research.

The study is limited by the cross-sectional design, which prevents drawing firm conclusions about temporal priority. Although prospective studies find that subjective social status predicts changes in health over time,[28,33] our findings could also reflect reverse causation, whereby adolescents with mental disorders rate their status lower than adolescents without mental illness. Another potential limitation is that we limited analysis of aggregate income effects to relatively small geographic areas. Previous research has shown stronger effects of income inequality when aggregated over larger areas (e.g., states or countries).[42,43] However, we also examined inequality at the state level and found no association with adolescent disorders. Additional limitations include the use of lay interviewers, rather than clinicians, to administer the diagnostic interviews and potential informant biases in the reporting of psychopathology by adolescents. The NCS-A relies mostly on adolescent reports of symptoms. Some research suggests that SES is more strongly associated with parent and teacher reports than adolescent reports of adolescent psychopathology.[44] Our use of adolescent reports as the mainstay of the assessment consequently might have attenuated SES–mental health associations in our study. A final noteworthy limitation is that the participation rate of initially selected schools was low. Methodological analysis, however, shows that school refusal is unlikely to have influenced our results, because the household sample included adolescents from schools that did not participate and comparison of disorder prevalence in participants from refusal schools and replacement schools revealed no differences either between rates of disorder or between associations of basic predictors with disorder.[12]

Results reported here suggest that the association between SES and adolescent mental health results most directly from individual perceptions of social status. We find virtually no associations between absolute income, inequality, or relative deprivation and past-year mental disorders; a modest association with parental education; and a consistent association with subjective social status. These findings mean that subjective judgments of status might be one mechanism by which SES gets "under the skin" to influence health outcomes, highlighting a potentially modifiable target for

interventions aimed at reducing status-based disparities in health. ◼

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Contributors

K. A. McLaughlin conceived of the study question and statistical analysis and led writing and revision. E. J. Costello conceived of the study question, oversaw statistical analysis, and assisted in writing and critical revision. W. Leblanc and N. A. Sampson implemented statistical analysis. R. C. Kessler was responsible for all aspects of data collection, analysis, and critical revision. All authors revised the article for important intellectual content and approved the final version.

Human Participant Protection

The institutional review boards of both Harvard Medical School and the University of Michigan approved the study.

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